show the rich field of study the West opened up in the geographical distribution of its Fauna and Flora. There are also natural reasons why certain species of animals and plants are restricted to certain geographical areas, and it is his purpose to commence the accumulation of materials towards a memoir on the geographical distribution of the Fauna and Flora west of the Mississippi.

He also exhibited a photograph of matting from New Iberia, Louisiana; this matting was found in the deposits of salt near that place, which he described.

He then referred to the importance of the lignite beds of the Upper Missouri, and the value of this article as a fuel in a region where timber is rarely to be found.

New nomination No. 568 was read.

The list of surviving members was read, comprising the number, on the 1st January, 1867, of 410, of whom 262 were in the United States, and 148 in foreign countries.

No. 76 of the Proceedings of the Society was laid on the table.

And the Society was adjourned.

Stated Meeting, February 15, 1867.

Present, sixteen members.

Prof. CRESSON, Vice-President, in the Chair.

Prof. Stillé and Dr. Packard, recently elected members, were introduced and took their seats.

Letters were read from J. S. Newberry, dated February 6, 1867; from George P. Dunning, February 8, 1867; Andrew Mason, dated February 8, 1867; and H. S. Osborn, February 12, 1867, severally acknowledging the receipt of the notice of their election as members and of their acceptance. And from the Physical and Natural History Society at Geneva, October 15; from the Geological Society of Glasgow, November 19; from the Bavarian Academy of Sciences, December 1, announcing donations to the Library. Also, from

the Royal Danish Society of Sciences at Copenhagen, March 31 and September 27; from the Royal Society of Edinburgh, December 4; from the Academy of Sciences at Chicago, February 1st; from the Historical Society of Pennsylvania; from the Essex Institute, Salem, February 13; from the New York Historical Society, severally acknowledging the receipt of publications of the Society.

A letter from T. Morris Perot, President of the Mercantile Library, was read.

Donations to the Library were announced as follows: From the Royal Society of Victoria at Melbourne; from the Royal Danish Astronomical Society at Copenhagen; from the Upper Lausatian Society of Sciences at Görlitz; from the Royal Prussian Academy at Berlin; from the Zoological Garden at Frankfort au Main; from the Society of Natural History at Strasburg; from the Munich Observatory; from the Royal Bavarian Academy at Munich; from the Physical and Natural History Society at Geneva; from the Geographical Society at Paris; from the Geological Society at Glasgow; from the Royal Society of Edinburgh; from the Leeds Philosophical and Literary Society; from Henry Denny; from the Society of Arts and of the Institutions in Union at London; from the Royal Geographical Society of London; from Messrs. La Rue, Stewart & Loewy, London; from A. H. Worthen of the Geological Survey of Illinois; from the New Jersey Historical Society; from the Water Department of this city; from Dr. Hayden; from the Franklin Institute; from the Academy of Natural Sciences of Philadelphia; from the publishers of the Medical News and Library.

Dr. Hayden introduced the subject of photographic representations of the Indian aborigines, resident in the regions west of the Mississippi, and recommended the preservation of photographs of persons and scenery from that part of the country in albums of the Society.

The proceedings of the Board of Officers and Council at their last meeting were read.

The subject of an exchange of publications with the Geo-

logical Society of Glasgow, was referred to the Secretaries, and to report.

It was ordered that the Transactions, new series, be presented to the Library of the College of Pharmacy.

The following resolution, offered by Dr. Hayden, was adopted:

Resolved, That a committee of three be appointed to procure photographic portraits of North American Indians for ethnological purposes, and that an appropriation of fifty dollars be now made to carry the object into effect.

The following named gentlemen were appointed: Dr. Hayden, Dr. Wilcocks, and Mr. Peale.

Dr. Hayden spoke of the great scarcity of timber in certain parts of the country about the upper waters of the Missouri, and suggested the entire practicability of supplying the country below with timber floated from the Black Hills down the Sheyenne to the Missouri, and alluded to the resources which were destined to exercise a great influence on the future advancement of that region.

Between the Mississippi and the eastern slope of the Rocky Mountains, the greater part of the land is properly entitled to the appellation of prairie country. After passing westward of longitude 95°, the timber becomes very scarce, until very little is seen except that which skirts the streams. It is safe to say that not more than one acre in fifty thousand is occupied by good forest trees, over and comprising a belt or zone of five hundred miles in width, extending from latitude 49° to New Mexico. Inasmuch as the geological formations which underlie that region are for the most part of the Mezoic and Cenozoic ages, no very valuable beds of coal need be looked for. It is true that the lignite beds of one of the great tertiary may supply a considerable amount of fuel, yet that supply will be somewhat uncertain in its character. It becomes therefore a question of great importance to the Western settlers, who are pushing westward very rapidly and taking possession of those fertile lands, where they will get their supply of timber for building and other economical purposes. The Black Hills, which form a part of Southwestern Dakota, are at this time attracting a great deal of attention, and

seem to present one of the most important fields of enterprise in the West.

All of Dakota is most excellent for grazing and much of it for agricultural purposes, but its great deficiency is its want of a proper supply of timber for fuel and for building purposes. It therefore becomes a question of absorbing interest to the settlers how this defect can be remedied. I will attempt to explain this point as clearly as possible, and the facts which I present have been obtained by years of exploration in these Western regions before Dakota was organized as a territory. If any one will examine my report and scientific papers, published from time to time since 1850, he will find that I have always earnestly advocated the industrial interests of the great Northwest, though my attention was so absorbed in the grand scientific results that I could never foresee the marvellous progress which has already been made.

The Black Hills form the most eastern outlier of the main chain of the Rocky Mountains, and would appear to be an independent elevation were it not for a low anticlinal which extends across the plain country southward, connecting them with the Laramie range. Very little was known of those hills until they were explored in the summer of 1857 by a United States Expedition, under the command of General G. K. Warren, U. S. A., to which expedition I had the honor of being attached, as geologist and naturalist. A preliminary report of the results of this exploration was presented to the War Department by General Warren in 1859, and published by Congress under the title of "Explorations in Nebraska and Dakota, in the years 1855–6 and 7."

The Black Hills lie between the 43d and 45th degrees of latitude, and the 103d and 105th meridians of longitude, and occupy an area about one hundred miles in length, and about sixty in breadth, or about six thousand square miles. The shape of the mass is elliptical, and the major axis tends about 20° west of north. The base of these hills is about two thousand five hundred to three thousand feet, and the highest peaks six thousand seven hundred feet above the ocean. The whole range is clasped, as it were, by the north and south forks of the Big Sheyenne River, the most important stream in this region. The north branch passes along the north side of the range, receiving very many of its tributaries, and most of its waters from it, but takes its rise far to the westward of the range near the sources of Powder River, in the divide between the waters of the Yellowstone and those of the Missouri.

The south fork also rises in the same divide, flowing along the southern base of this range, and also receives numerous tributaries which have their sources in it. These two main branches unite about thirty miles east of the Black Hills, forming the Big Sheyenne, which empties into the Missouri about sixty miles above Fort Pierre. The Moreau, Grand, Cannon-ball, and other rivers, flowing into the Missouri, north of the Sheyenne and south of the Yellowstone, rise in a high tertiary divide north of the Black Hills, and are for the greater part of the season quite shallow, and sometimes nearly dry; but the Little Missouri derives a portion of its waters from the Black Hills, through a number of small branches which flow from the northwestern slope. We thus see that the Black Hills do not give rise to any important stream, if we except the Little Missouri, a few branches of which flow from springs near the base of the hills; but supply a comparatively small quantity of water from that source. The Sheyenne is fed, the most part, from the numerous small streams which issue from copious springs in the more elevated portions. It would seem, therefore, that the Black Hills do not have a marked influence on the drainage of the West.

As I have before remarked, the Black Hills occupy an area of about six thousand square miles. I regard it as within bounds to say that at least one-third of this area is covered with a fine growth of good pine timber. You can see, therefore, that within the limits of the Territory of Dakota, you have 1,280,000 acres of as good pine lumber as can be found in all the Western country. This timber is of a fine healthy growth, from two to four feet in diameter at the base, and often ascending eighty feet without a limb.

The question in regard to the quantity of pine timber in the Black Hills being settled, the next point of importance is to determine upon a plan to transport it to the settled portions of the Territory. I think that the future will show that there are no obstacles in that direction that can resist the will of the Dakotians. Allow me to quote from a report to General Warren, dated March 15th, 1856, when I used the following language: "The Black Hills, which appear in the distance, and derive their name from their dark and gloomy appearance, contain an inexhaustible quantity of the finest timber, mostly pine, which will doubtless remain undisturbed for many years to come. I will, however, propose a plan for obtaining this timber, and rendering it useful to future settlers, though I do it with some hesitation, lest it may seem visionary. The left fork of the Sheyenne passes through the northern portion of the Black Hills, and, even there, is a consid-

erable stream, from thirty to fifty yards wide. In the spring the river is much swollen, and the current exceedingly rapid, and the timber, if cut and hauled to the banks of the river, might be floated down into the Missouri with considerable safety and ease."

When I wrote the above paragraph, I did not foresee that this Western country would be so soon settled almost within sight of the Black Hills. When I ascended the Missouri for the first time in 1853, Kansas was a wild Indian Territory and Government agents driving from it all white men who might be attempting to gain a foothold there. Now Kansas is a State, Nebraska has just become one, and Colorado is knocking loudly at the door, and must soon be admitted. Then will follow in quick succession, Dakota, Montana, and Idaho. Since 1853, I have explored with more or less minuteness, the Territories of Kansas, Nebraska, Dakota, Montana, Idaho, and Colorado, and I need hardly say that I have watched with the deepest interest every step in the progress of their advancement.

Some objection might arise in regard to the climate and the fertility of the soil in the vicinity of the Black Hills. I would reply that on the 9th of March, 1855, I gathered flowers on the foot-hills of the mountains, and the green grass was springing up everywhere, and the antelopes were sunning themselves in flocks upon the hillsides. Spring had fairly come. For a considerable distance either way from the mountains, the soil is quite fertile, and would, in my opinion, be adapted to the cultivation of any of the cereals which are raised in our Western States.

The next question that arises, pertains to the mineral resources of the Black Hills. I will not speak of their geological structure in detail at this time, but reserve that for a future period. The gold and most of the valuable minerals along the eastern slope of the Rocky Mountains, are found in the metamorphic, or as they are sometimes called the azoic (destitute of organic life) rocks, that is crystalline, limestones, slates, quartz beds, &c. These rocks occur around the Black Hills with a thickness of one thousand to two thousand feet. To what extent the precious metals will be found in these rocks I will not attempt to foretell. My facilities for examinination were very poor, and only a superficial one could be made; but enough was determined to show that gold and silver occurs in greater or less quantities, and that all the other minerals occur in abundance. Gypsum is found in beds from ten to fifty feet in thickness—beautiful snowy gypsum.

The nucleus of the Black Hills is formed by red feldspathic gran-

ite, surrounded with a belt of metamorphic azoic rocks. Resting unconformably upon them are a series of sedimentary beds inclining at various angles from either side of the granitic nucleus. Resting unconformably upon the azoic beds is the Potsdam sandstone with its characteristic fossils. This is the only member of the Silurian age represented in the Rocky Mountains. Next comes the limestones of the Upper Coal Measures, then the red beds of the Triassic, the Jurassic marls, cretaceous clays, and beds of both basins of the Tertiary Lignite and White Rivers. The evidence is clear that all these beds once extended uninterruptedly in a horizontal position over the area now occupied by the Black Hills.

And the Society was adjourned.

Special Meeting, February 19, 1867.

Present, twenty members.

Dr. Wood, President, in the Chair.

The President stated that intelligence of the death of Professor Alexander Dallas Bache, on the 15th inst., had been received, and that he had convened this meeting for the purpose of taking such measures as might be deemed proper for the loss of so distinguished an associate, and to tender the use of the hall to the committee appointed by a meeting of the scientific, learned, and other bodies of the city, held at the Chapel of the University of Pennsylvania this day.

Mr. Fraley then reported to the Society the proceedings of said meeting, and gave a feeling and appropriate sketch of the life, character, and services of Prof. Bache, and offered the following resolutions, which were adopted:

Resolved, That a committee be appointed to prepare appropriate resolutions, expressive of the regret and sorrow of the Society at the loss it has sustained by the death of Alexander Dallas Bache.

Resolved, That the hall of the Society be placed at the disposal of the committee, this day appointed at a meeting held by the mem-